## REMARKS

The Office Action mailed February-28, 2001 (hereinafter "Office Action"), rejected Claims 1-3, 8, 10, 11, 15, 16, and 19 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,105,036 issued to Henckel. The Office Action also rejected Claims 12-14 and 21 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,105,036 issued to Henckel. Additionally, Claims 1, 4-7, 15, 17, 19, and 20 were rejected by the Office Action under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,157,933 issued to Celi, Jr. et al. in view of a nonpatent reference titled JAVA 1.1, SECOND EDITION, by Jaworski. Further, in response to applicant's request for clarification as to the status of Claims 9 and 18, the Office Action was revised to include Claim 9 in the rejections under 35 U.S.C. § 102(e) as being anticipated by Henckel and Claim 18 in the rejections under 35 U.S.C. § 103(a) as being unpatentable over Celi, Jr. et al. in view of Jaworski. Applicant respectfully traverses the Office Action.

Claims 1, 8, 10, and 19 have been amended and Claims 22 - 27 have been added to more particularly point out and distinctly claim the subject matter that applicant regards as being his invention. Applicant respectfully submits that the cited and applied references, alone or in combination, fail to teach or suggest obtaining a persistent representation of the structure of the complex data object as a sequence of directly executable instructions, which are calls to predefined functions. Applicant also respectfully submits that the cited and applied references, alone or in combination, fail to teach or suggest calling predefined functions that correspond to the sequence of directly executable instructions so as to construct the complex data object directly from the persistent representation. Before discussing in detail the reasons why applicant believes that Claims 1 - 27 are allowable, brief descriptions of the present invention and the cited and applied references are presented.



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

I. Summary of the Invention

The present invention is generally directed to providing a method, system, and storage medium for recreating a complex data object from a persistent representation of the structure of the complex data object. The persistent representation includes a sequence of directly executable instructions that are used to recreate the structure of the complex data object. The directly executable instructions are calls to a library of predefined functions. The complex data object is constructed directly from the persistent representation by calling the predefined functions that correspond to the sequence of directly executable instructions.

In accordance with one aspect of the present invention, a computer-implemented method for recreating a complex data object having a structure is provided. A computer obtains a persistent representation of the complex data object as a sequence of directly executable instructions. The directly executable instructions are calls to a set of predefined functions. The computer interprets the directly executable instructions as calls to a set of predefined functions. The complex data object is constructed by the computer directly from the persistent representation by calling the predefined functions corresponding to the sequence of instructions contained in the persistent representation.

In accordance with another aspect of the present invention, a system for recreating a complex data object having a structure is provided. The system includes a persistent representation of the complex data object. The persistent representation contains a sequence of directly executable instructions, which are calls to a predefined set of data types and methods for creating complex data objects. The system also includes a library of the predefined set of data types and methods for creating complex data objects. The system additionally includes a program interpreter for directly executing the instructions as a sequence of calls on the library so as to directly construct the complex data object from the persistent representation. In a further



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

aspect of the present invention, the program interpreter consists of a stack-based virtual machine with a temporary storage array.

In accordance with yet another aspect of the present invention, a system for recreating a complex data object from a persistent representation of its structure is provided. The system includes a library having a predefined set of data types and methods for creating complex data objects. The system also includes a program interpreter for interpreting the contents of the persistent representation as a sequence of directly executable instructions. The program interpreter also executes the instructions as a sequence of calls on the library so as to construct the complex data object directly from the persistent representation. In a further aspect of the present invention, the program interpreter consists of a stack-based virtual machine with a temporary storage array.

In accordance with yet still another aspect of the present invention, a storage medium containing a persistent representation of a multicomponent data object is provided. The persistent representation includes a sequence of instructions directly executable on a program interpreter so as to recreate the structure of the multimedia object.

In still a further aspect of the present invention, a storage medium is provided for the instructions and data that directly construct a complex data object directly from a representation of the structure of the complex data object as a sequence of directly executable virtual instructions, which are calls on a library of predefined functions.

Significant advantages result from the unique methods, systems and storage media provided by the present invention for recreating complex data objects. By providing a structure of the complex data object as a sequence of directly executable instructions, the complex data object can be constructed by directly executing a sequence of instructions. This mitigates the need for parsing and translating an explicit definition of the complex data object's structure.



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

Accordingly, the present invention provides significant advantages by increasing the processing speed and reducing the strain on computer memory and processing resources.

The present invention provides further advantages by utilizing a stack-based virtual machine with a temporary storage array. A stack-based virtual machine program interpreter allows for a more efficient design of instruction codes, which reduces program size, and makes the program faster to download over a communications link. The stack-based virtual machine program interpreter also uses less computer memory and resources, and incurs minimal startup penalties in recreating the multimedia object. Additionally, the use of temporary storage array causes the program to execute the persistent representation more efficiently.

II. Summary of Henckel

Henckel is directed toward a tool for assisting a user in developing multimedia presentation applications. More specifically, Henckel purportedly teaches displaying a source code file with an ordered arrangement of object definitions of multimedia objects. The multimedia object definitions can selectively be displayed in either textual or multimedia representations in response to user input. The representations are inline within the ordered arrangement of object definitions, such that a visual indication of the arrangement of such object definitions in the source code file is maintained. In addition, Henckel purportedly teaches that data sets can selectively be displayed in inline shorthand notations within the ordered arrangement to permit a user to minimize the representation of a data set in a source code file, or to expand the representation of the data set for viewing or editing the specific data in the set. However, Henckel fails to teach or suggest obtaining a persistent representation of the structure of the complex data object as a sequence of directly executable instructions, which are calls to predefined functions. Henckel also fails to teach or suggest calling predefined functions that correspond to the sequence of directly executable instructions so as to construct the complex data object directly from the persistent representation.



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

III. Summary of Celi, Jr. et al.

The Celi, Jr. et al. patent is directed toward a method and apparatus for downloading multiple animated images on a Web page during browsing over a network with limited throughput. Specifically, Celi, Jr. et al. purportedly teach a method in which a Web page and associated Java applet with default image are loaded. The loaded Java applet then displays the default image. After displaying the default image, the Java applet requests the Web server to deliver an image series, which is a list of related images. Once the first image in the series is downloaded, the Java animation applet prepares the image for display. The Java applet displays screen transition effects between the downloading of each subsequent image in the image series list. The screen transition effects are displayed at a speed that will cause them to finish at the same time the next image is finished being downloaded and prepared for viewing. This creates the perception to the user of not waiting for additional information to download in the background.

Celi, Jr. et al. fail to teach or suggest obtaining a persistent representation of the structure of the complex data object as a sequence of directly executable instructions, which are calls to predefined functions. Celi, Jr. et al. also fail to teach or suggest calling predefined functions that correspond to the sequence of directly executable instructions so as to construct the complex data object directly from the persistent representation.

IV. Summary of Jaworski

The nonpatent reference titled JAVA 1.1, SECOND EDITION, by Jaworski, provides several examples of Java applets to illustrate different aspects of Java classes and methods. Jaworski teaches a Java applet utilized to display text in the browser window. Jaworski also teaches a Java applet that shows how to load and play audio files and images. Jaworski further teaches Java applets that may be implemented to perform functions such as displaying text, video, or images in a browser application. However, Jaworski fails to teach or suggest obtaining a



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

persistent representation of the structure of the complex data object as a sequence of directly executable instructions, which are calls to predefined functions. Jaworski also fails to teach or suggest calling predefined functions that correspond to the sequence of directly executable instructions so as to construct the complex data object directly from the persistent representation.

V. Rejection of Claims 1-3, 8-11, 15, 16, and 19 Under 35 U.S.C. § 102(e)

Claims 1-3, 8-11, 15, 16, and 19 were rejected by the Office Action under 35 U.S.C. § 102(e) as being anticipated by Henckel. The Office Action states that Henckel teaches a source file containing an ordered arrangement of interpretative program statements and object definitions, which is displayed so that the object definitions can be in either textual or multimedia representations. The Office Action also states that Henckel teaches the display or presentation of multimedia objects, with regard to Claims 2, 3, 9, 11, and 16.

In its present form, Claim 1 reads as follows:

> 1. A computer-implemented method for recreating a complex data object having a structure, the method comprising:
>
> obtaining a persistent representation of the structure of the complex data object as a sequence of directly executable instructions, wherein the directly executable instructions are calls to a set of predefined functions;
>
> interpreting the directly executable instructions as calls to a set of predefined functions; and
>
> calling a predefined function corresponding to each directly executable instruction in the sequence of directly executable instructions so as to construct the complex data object directly from the persistent representation.

As explained above, Claim 1 recites a method for constructing complex data objects from a persistent representation of the object's structure. By directly executing a sequence of instructions that are calls to a set of predefined functions, the complex data object is constructed without parsing and translating an explicit definition of the complex data object's structure. Thus, the directly executable instructions recited in Claim 1 provide the advantage of increased processing speed and reduced use of computer memory and processing resources in constructing complex data objects.



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

In contrast, Henckel is limited to teaching the use of conventional interpretive program statements and definitions that explicitly specify the structure of the multimedia object and require parsing and translating. Henckel generates multimedia representations by using static data structures, such as trees, that are obtained by parsing and translating source code.

> Browser 34 typically operates by *parsing the source code provided by main block 31 to form a parse data structure such as a tree*, and then utilizing the data structure to generate graphical and/or audio data for output to display 22 and audio system 29, in a manner that is well understood in the art. (Column 6, lines 31-36.) (Emphasis added.)

The use of static tree structures to generate multimedia objects, such as graphic or audio objects, is known to the conventional art.

Because Henckel relies upon utilizing conventional static data structures parsed from source code, applicant asserts that Henckel fails to teach or suggest obtaining a persistent representation of a complex data object as a sequence of directly executable instructions for constructing the complex data object. More specifically, Henckel fails to teach or suggest that the sequence of directly executable instructions includes function calls for generating the complex data object. Therefore, Henckel cannot teach calling the functions to generate a complex data structure. Thus, applicant asserts that Henckel fails to teach or suggest the invention as recited by Claim 1. Therefore, applicant respectfully submits that amended Claim 1 is allowable and respectfully requests a withdrawal of the § 102(e) rejection.

Claims 2-3 depend from Claim 1. Therefore, the analysis discussed above with respect to Claim 1 also applies to Claims 2-3. Therefore, applicant respectfully submits that Claims 2-3 are also allowable for the same reasons as Claim 1, and respectfully requests a withdrawal of the § 102(e) rejection.

For the same reasons as discussed above with respect to Claim 1, applicant's invention as recited in Claim 8 is not anticipated by the teachings of Henckel. Claim 8 recites a "persistent



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

representation of the structure of the complex data object including a sequence of directly executable instructions." The sequence of directly executable instructions are "calls to a predefined set of data types and methods for creating complex data objects." Claim 8 further recites "a library having the predefined set of data types and methods" and "a program interpreter for directly executing the instructions as a sequence of calls on the library so as to directly construct the complex data object from the persistent representation."

As discussed above with respect to Claim 1, Henckel fails to teach or suggest recreating a complex data object from a persistent representation of its structure as a sequence of directly executable instructions. Therefore, applicant respectfully submits that Claim 8 is allowable and respectfully requests a withdrawal of the § 102(e) rejection. Similarly, because Claim 9 depends from Claim 8, applicant respectfully submits that Claim 9 is allowable for the same reasons as discussed with respect to Claim 8 and respectfully requests a withdrawal of the § 102(e) rejection.

For the same reasons as discussed above with respect to Claim 1, applicant's invention as recited in Claim 10 is not anticipated by the teachings of Henckel. Claim 10 recites "a library having a predefined set of data types and methods for creating complex data objects" and "a program interpreter for interpreting the contents of the persistent representation as a sequence of directly executable instructions, and for executing those instructions as a sequence of calls on the library so as to construct the complex data object directly from the persistent representation."

As stated above with regard to Claim 1, Henckel does not teach or suggest recreating a complex data object by directly executing the contents of the persistent representation of its structure as a sequence of calls on the library. Therefore, applicant respectfully submits that Claim 10 is allowable and respectfully requests a withdrawal of the § 102(e) rejection. Similarly, because Claim 11 depends from Claim 10, applicant respectfully submits that Claim 11 is allowable for the same reasons as discussed with regard to Claim 10 and respectfully





LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

requests a withdrawal of the § 102(e) rejection.

For the same reasons as discussed above with respect to Claim 1, applicant's invention as recited in Claim 15 is not anticipated by the teachings of Henckel. Claim 15, recites "a storage medium containing a persistent representation of the structure of a multi-component data object as a sequence of instructions directly executable on a program interpreter implemented in a digital computer so as to recreate the structure of the multi-component object."

As discussed above with respect to Claim 1, Henckel fails to teach or suggest a persistent representation of the structure of a multicomponent data object as a sequence of directly executable instructions. Therefore, applicant respectfully submits that Claim 15 is allowable and respectfully requests a withdrawal of the § 102(e) rejection. Similarly, because Claim 16 depends from Claim 15, applicant respectfully submits that Claim 16 is allowable for the same reasons as discussed above with regard to Claim 15 and respectfully requests a withdrawal of the § 102(e) rejection.

For the same reasons as discussed above with respect to Claim 1, applicant's invention as recited in Claim 19 is not anticipated by the teachings of Henckel. Amended Claim 19 recites a "storage medium containing computer-executable instructions and data for interpreting a persistent representation of the structure of a complex data object as a sequence of directly executable virtual instructions for directly constructing the complex data object as a series of calls on a library of predefined functions."



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

As discussed above with respect to Claim 1, Henckel fails to teach or suggest constructing a complex data object by interpreting a persistent representation of its structure as a sequence of directly executable virtual instructions that call predefined library functions. Therefore, applicant respectfully submits that Claim 19 is allowable and respectfully requests a withdrawal of the § 102(e) rejection.

VI. Rejection of Claims 12-14 and 21 Under 35 U.S.C. § 103(a)

The Office Action rejected Claims 12-14 and 21 under 35 U.S.C. § 103(a) as being unpatentable over Henckel. The Office Action stated that official notice was being taken that the advantages of using a virtual machine operating system with stack-based processing hardware were well-known at the time the present invention was made. The Office Action also stated that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a virtual machine in combination with the teachings of Henckel, because the accepted benefits of a stack-based virtual machine would have been expected when used for its known intended purpose. For the following reasons, applicant respectfully disagrees.

Claims 12-14 depend from independent Claim 10. Therefore, for at least the same reasons argued above with respect to Claim 10, dependent Claims 12-14 are allowable. In addition, dependent Claims 12-14 further add to the nonobviousness of applicant's system of Claim 10, and thus, are allowable for additional reasons, which are discussed below.

Dependent Claim 12 adds to the nonobviousness of the system of Claim 10 a program interpreter that is "a virtual machine located in a computer in which the data object is presented to the user." Henckel fails to teach or suggest using a virtual machine. Further, applicant asserts that Henckel provides no suggestion or motivation to utilize a virtual machine to process directly executable instructions containing function calls. Thus, Henckel further fails to teach all of the elements recited in Claim 12 and applicant respectfully requests a withdrawal of the §103(a) rejection with regard to Claim 12.



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

Dependent Claim 13 adds to the nonobviousness of the system of Claim 10 a program interpreter that is "a stack-based virtual machine." Applicant asserts that Henckel fails to teach or suggest utilizing a virtual machine and a stack to generate multimedia objects. Further, applicant asserts that Henckel provides no suggestion or motivation to utilize a stack-based virtual machine as a program interpreter to construct a complex data object. Thus, Henckel further fails to teach all of the elements recited in Claim 13 and applicant respectfully requests a withdrawal of the §103(a) rejection with regard to Claim 13.

Dependent Claim 14 adds to the nonobviousness of the system of Claim 10 a stack-based virtual machine that "further includes a temporary storage array." Applicant asserts that Henckel fails to teach or suggest using a stack-based virtual machine with a temporary storage array. Further, applicant asserts that Henckel provides no suggestion or motivation to utilize a stack-based virtual machine with a temporary storage array to process directly executable instructions to construct complex data objects. Thus, Henckel further fails to teach all of the elements recited in Claim 14 and applicant respectfully requests a withdrawal of the §103(a) rejection with regard to Claim 14.

Claim 21 depends from independent Claim 19. Therefore, applicant respectfully submits that Claim 21 is allowable for at least the same reasons argued above with regard to Claim 19. Dependent Claim 21 further adds to the nonobviousness of the storage medium of Claim 19 instructions and data that implement a stack-based virtual machine. As stated above, Henckel does not teach or suggest a stack-based virtual machine and provides no motivation for using a stack-based virtual machine. Thus, Henckel further fails to teach all of the elements recited in Claim 21 and applicant respectfully requests a withdrawal of the §103(a) rejection with regard to Claim 21.



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

VII. Rejection of Claims 1, 4-7, 15, 17-19, and 20 Under 35 U.S.C. § 103(a)

The Office Action rejected Claims 1, 4-7, 15, 17-19, and 20 under 35 U.S.C. § 103(a) as being unpatentable over Celi, Jr. et al. in view of a nonpatent reference titled JAVA 1.1, SECOND EDITION, by Jaworski. The Office Action states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the examples of Java applets taught by Jaworski with the retrieval and display of applet-embedded Web pages taught by Celi, Jr. et al. because Celi, Jr. et al. teach that applet content may be embedded. The Office Action additionally refers to Jaworski for teaching that some functions return an explicit result and some functions have arguments, which may further call another function or may be a constant value. The Office Action further states that one of ordinary skill in the art at the time of making applicant's invention would have known that method resolution between similarly named functions in object-oriented programming may be facilitated through argument matching. For the following reasons, applicant respectfully disagrees.

Claims 1, 4-7, 15, 17-19, and 20 recite subject matter directed to recreating a complex data object by obtaining and directly executing a persistent representation of the object's structure specified as a sequence of directly executable instructions that call a set of predefined functions. In contrast, applicant respectfully submits that both Celi, Jr. et al. and Jaworski are limited to teaching conventional techniques for displaying a multimedia object that involve parsing and translating an explicit structure of the multimedia object. More specifically, the Java applets taught by Jaworski and the applets embedded in the Web pages taught by Celi, Jr. et al. are conventional Java programs that can be downloaded over the Internet and executed on the recipient's machine. These types of conventional Java applets explicitly specify the structure of multimedia objects and must be parsed and translated by the browser for display.

Independent Claims 1, 15, and 19 recite recreating a complex data object by obtaining and directly executing a persistent representation of the object's structure specified as a sequence



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

of directly executable instructions that call a set of predefined functions. Because Celi, Jr. et al. and Jaworski rely on a static data structure, the references do not teach a method or computer-readable medium having directly executable instructions. Therefore, Celi, Jr. et al. and Jaworski fail to teach or suggest applicant's invention as recited by Claims 1, 4-7, 15, 17-19, and 20. Accordingly, applicant respectfully requests a withdrawal of the §103(a) rejection with regard to Claims 1, 4-7, 15, 17-19, and 20.

VIII. Conclusion

In view of the foregoing, applicant respectfully submits that all of the claims of the present application, Claims 1-27, are allowable over the cited and applied references, alone or in combination. Reconsideration and reexamination of the application are requested and allowance of the rejected claims and passage of the application to issue at an early date are solicited. If the Examiner has any questions or comments concerning this application, he is invited to contact the applicant's undersigned attorney at the number set forth below.

Respectfully submitted,

CHRISTENSEN O'CONNOR
JOHNSON KINDNESS$^{PLLC}$

Barbara M. Level
Registration No. 45,483
Direct Dial No. 206.695.1776

I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid and addressed to the Commissioner for Patents, Washington, D.C. 20231, on the below date.
Date: June 25, 2001



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS$^{PLLC}$
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

## VERSION WITH MARKINGS TO SHOW CHANGES MADE JUNE 25, 2001

In the Claims:

Please amend Claims 1, 8, 10, and 19 as follows:

1. (Amended) A computer-implemented method for recreating a complex data object having a structure [by executing instructions in a suitably programmed digital computer], the method comprising:

[reading] obtaining a persistent representation of the structure of the complex data object as a sequence of directly executable instructions, wherein the directly executable instructions are calls to a set of predefined functions;

interpreting the directly executable instructions as calls to a set of predefined functions; and

calling [different ones of the] a predefined function[s in accordance with the] corresponding to each directly executable instruction in the sequence of directly executable instructions so as to construct the complex data object directly from the persistent representation.

8. (Amended) A system for recreating a complex data object, the system comprising:

a persistent representation of the structure of the complex data object and containing a sequence of directly executable instructions, wherein the instructions are calls to a predefined set of data types and methods for creating complex data objects;

a library having the predefined set of data types and methods for creating complex data objects; and

a program interpreter for directly executing the instructions as a sequence of calls on the library so as to directly construct the complex data object from the persistent representation.

10. (Amended) A system for recreating a complex data object from a persistent representation of its structure, the system comprising:

a library having a predefined set of data types and methods for creating complex data objects; and

a program interpreter for interpreting the contents of the persistent representation as a sequence of directly executable instructions, and for executing those instructions as a sequence



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100

of calls on the [API] library so as to construct the complex data object directly from the persistent representation.

19. (Amended) A storage medium containing computer-executable instructions and data for interpreting a persistent representation of the structure of a complex data object as a sequence of directly executable virtual instructions for directly constructing the complex data object as a series of calls on a library of predefined functions.

Claims 22 through 27 have been added.

BML:ap/ws/sbk



LAW OFFICES OF
CHRISTENSEN O'CONNOR JOHNSON KINDNESS PLLC
1420 Fifth Avenue
Suite 2800
Seattle, Washington 98101
206.682.8100